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THE LIFE HISTORY OF *TATOCHILA DISTINCTA DISTINCTA*, A RARE BUTTERFLY FROM THE *PUNA* OF NORTHERN ARGENTINA (LEPIDOPTERA: PIERIDAE)

ARTHUR M. SHAPIRO

Department of Zoology, University of California,
Davis, California 95616

Abstract.—*Tatochila distincta distincta* is a very rare pierid found above 3,000 m in the *puna* of far northern Argentina. Its egg, larva, pupa and aspects of its behavior and ecology are described. All are similar to other *Tatochila* heretofore described and support the previously postulated close affinity of the *xanthodice* and *sterodice* species-groups.

This is the fifth in a series of papers describing the preparatory stages of the Pierini of the Andean region. The largest pierine genus in the Andes is *Tatochila* Butler, which was monographed by Herrera and Field (1959). *Tatochila* includes five species-groups, of which at least some information on life history is now available for three: the *xanthodice* Lucas group (Shapiro, 1978) and the *sterodice* Stgr. and *autodice* Hbn. groups (Shapiro, 1979). *Tatochila distincta* Jörgensen is one of the rarest and least-known members of the genus. It was described from the Province of Catamarca, northwestern Argentina (Jörgensen, 1916); additional specimens known to Herrera and Field were from the adjacent Province of Tucumán, as well as one from Puno, Peru, which they regarded as dubious but which probably represents a subsequently described subspecies which is widespread in southern Peru. Herrera and Field placed *distincta* with *xanthodice* in their Group E based on genital morphology—specifically aedeagal shape, which, they noted, approximated the condition in the genera *Hypsochila* Ureta, *Phulia* Herrich-Schaeffer, and *Piercolias* Stgr. This assignment—based as it is on a single character, in a group where parallelisms are rampant—has always seemed tenuous, especially since the habitus of *distincta* is so different from *xanthodice* and its range so widely disjunct from that north-Andean species. There have been no published natural-history observations on *distincta* since Jörgensen wrote: "This very interesting species appears to have a very limited distribution. I have hunted it only in some localities of the Aconquija range: Cerro Negro, 3500m; Cerro de la Ensenada, 3200m; La Ollada, 3100. It flies in the months of February and March in the windiest and most sun-bathed gorges and summits, especially in the morning, usually in the company of *macrodice*. When the sun goes in it flies no more . . . ."

Tatochila distincta distincta occurs in the bleak high plateaus, or *puna,* of the Provinces of Salta and Jujuy in northern Argentina near the Bolivian border. It is greatly outnumbered by *T. sterodice macrodice* Stgr., with which it usually flies. On 7 February 1985 a female was collected near Tres Cruces, Province of Jujuy, at 3,800 m. She oviposited freely on *Brassica campestris* L. which was collected from vegetable gardens in the Quebrada de Humahuaca on the trip down to the city of San Salvador

de Jujuy, and the eggs were transported to Davis, California where the larvae were reared on *B. nigra* (L.) Koch. and *B. kaber* (DC.) Wheeler. Rearing was on cuttings in cardboard cylinders 21 × 11 cm with transparent mesh tops under 10L:14D, 23.9°/12.8°C in growth chambers. Preserved early stages are being retained at Davis at this time for comparative studies of chaetotaxy and development. Color descriptions were prepared from life. Those in parentheses refer to the system of Kornerup and Wanscher (1978).

DESCRIPTIONS

Egg (Fig. 1). Erect, fusiform, 1.15 × 0.38 mm, the chorion sculptured as figured, with about 11 vertical and about 53 horizontal ribs. Light orange (5A5) when laid, becoming slate-gray about 12 h before hatching. Laid singly on leaves and stems of leafy Crucifers in captivity, not observed afield. The larva eats its eggshell after hatching, as is usual in *Tatochila*. Time to hatch, 5 days.

Larva: First instar (Fig. 2). At hatch 1.5 mm. Dull ochre ("grayish orange," 5B3) with black head, apparently unmarked except for numerous minute tubercles bearing short setae; turning gray-green ("ash blonde," 3C3) after feeding. Feeds by excavating pits in leaves and flower buds. Length of instar, 3 days.

Second instar. After molt 4 mm. Gray-green (3C3) with a faint dorsal line and subdorsal and stigmatal stripes, all yellow (4A5, "butter yellow"). Head blackish to slate gray (4F2, "smoke brown"), venter gray-green (3D2, "yellowish gray"). Length of instar, 4 days.

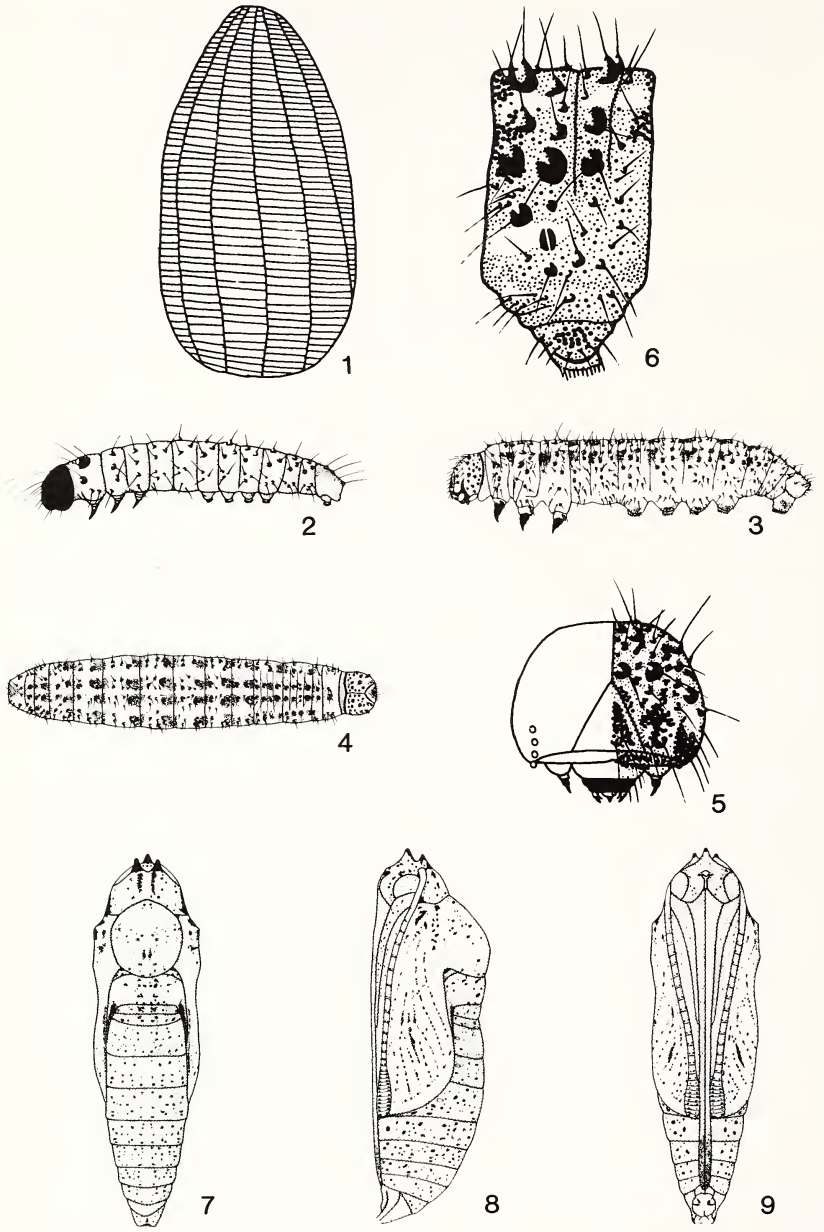
Third instar. After molt 7 mm long at rest. Similar to second instar, with a distinct orange "collar" behind the head (8A8, "orange red"). The larva feeds actively on the aerial parts of the plant, and when not feeding sits lengthwise on the stem. Length of instar, 5 days.

Fourth instar. After molt 11 mm. Slate gray (4F2) with black tubercles, the dorsal and subdorsal stripes distinct, bright yellow (4A5, "butter yellow"), collar orange as before, head slate gray mottled with black; venter gray-green (3D2, "yellowish gray") seemingly finely irrorated with black and pale yellow. Length of instar, 5 days.

Fifth instar (Figs. 3–6). After molt 18 mm, reaching 30 mm at maturity. Body with many black tubercles in 3 sizes, each bearing a short whitish hair. Head slate gray, mottled with black, ocelli black; body slate gray, the dorsal and subdorsal stripes distinct, the subdorsals wider, all bright yellow as before; stigmatal stripe vague, less contrasting, often broken into spots which may be orange; just before the intersegmental membrane at the anterior end of each segment the subdorsal stripes are tinged more or less with orange. Venter gray-green (3D2) as before. Spiracles black. True legs and crochets black. The ground color contains very distinct darker, squarish black spots anteriorly at the front of each segment, as illustrated. Larvae "stem" the host, sitting quietly when not feeding. The last 1–3 fecal pellets are red-tinged. Time to leaving the host (prepupation), 8–9 days.

Prepupa. Formed away from the host, after several hours of wandering. Attached by the anal prolegs and a girdle around the thorax; usually vertically, head up. Length of prepupal period, 15–30 hr.

Pupa (Figs. 7–9). 20 × 5 mm. Initially colored like the prepupa, assuming its final coloration in 6 hr. Ground color ochre (5B3, "grayish orange") with numerous small



Figs. 1–9. *Tatochila distincta distincta* from Province of Jujuy, Argentina. 1. Egg. 2. Newly hatched larva showing primary tubercles and setae. 3. Mature larva, lateral view. 4. Same, dorsal view. 5. Frontal view of mature larval head capsule. 6. Mature larva, lateral view of seventh segment. 7. Pupa, dorsal view. 8. Pupa, lateral view. 9. Pupa, ventral view.

black tubercles corresponding to their larval positions, inconspicuous; head and appendage-cases darker ochre (5C4, "golden blonde") varying to slate green (25D5, "greyish green") with no to considerable black filling between the veins on the wing-cases. Dorsal and subdorsal lines present, yellow, weakly contrasting in life; a paler yellow shade below the spiracles; tongue-case long, nearly reaching the genital area. Attached head-up. Supraocular and frontal prominences moderate, about as in *T. xanthodice*; supraspiraculars very faintly if at all indicated; the mid-dorsal line moderately carinate on the thorax, slightly ridged on the abdomen but bearing no prominences. Pigment sequence as usual (eyes, wings, body; in females the white wing-color turns to yellow); meconium red (10B8, "currant"); time to hatch, 12–18 days.

DISCUSSION

As noted previously (Shapiro, 1979), the early stages of the *Tatochila sterodice* Stgr. species-group and those of *T. xanthodice* are very similar and support a close relationship between them. There are no great surprises in the early stages of *T. distincta distincta,* which show resemblances to both. The larva throughout its development retains the yellow mid-dorsal line, which is usually lost in *xanthodice.* The color scheme of the pupa is rather more like the *sterodice* group; the prominences are very similar to those of sympatric *macrodice,* and the tongue-case is the longest yet seen in *Tatochila.* On the basis of the early stages alone one would have no basis to assign this species to one species-group or the other; it appears that the morphology of *Tatochila* immatures is very conservative.

The wild host plant of this little-known species remains undiscovered, but it is surely a Crucifer feeder. Eggs were also obtained from the Peruvian subspecies, *T. d. fieldi* Herrera, on Crucifers but were subsequently lost. Members of the two species-groups not yet reared (the *orthodice* Weymer and *theodice* Bdv. groups; the former is heterogeneous and may be further subdivided) will not lay on Crucifiers in captivity (an association with Valerianaceae is suspected in some cases). Of the *Tatochila* karyotyped by de Lesse (1967), all the Crucifer feeders (*autodice* Hbn. of the *autodice* group and *vanvolxemii* Capr., *arctodice* Stgr., and nominate *sterodice,* all of the *sterodice* group) had n = 28 while three non-Crucifer feeders (*sagittata* Roeb. and either *orthodice* or *stigmadice* Stgr. of the *orthodice* group, plus *theodice*) had n = 27 and a fourth (either *stigmadice* or *orthodice*; the two were inadvertently confounded) had n = 28. These findings seem to strengthen the apparent division of the genus into at least two putative subgenera.

Tatochila distincta distincta occurs in the seasonally arid *puna* in a very different habitat from the *páramo*-dwelling north-Andean *xanthodice,* but shares with it a hilltopping epigamic strategy. In Salta and Jujuy males tend to fly 2–8 m downwind from the summit, rarely crossing it and usually remaining below the area patrolled by male *T. s. macrodice,* although interactions are not uncommon as both species circle between the summit area and the base of the mountain. *T. d. fieldi* may behave similarly; males believed to be this species, but never captured for certain identification, behave in this manner near Abra Málaga, Cusco. (Females have been collected down the canyon from the hilltopping site.) In Jujuy *T. d. distincta* co-occurs on or near summits with *Hypsochila wagenknechti sulfurodice* Ureta and *Phulia* "*nym-*

phula" Blanch. as well as *T. s. macrodice,* along with various other butterflies of which the most conspicuous is the nymphalid, *Yramea sobrina* Weym. It should be plain that hilltopping behavior has arisen many times, even within the Pierini, and that it is not useful in phylogenetic inference.

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Note added in proof. On 23 January 1986 two female *T. distincta* were followed for about 30 min each at Tres Cruces and seven ovipositions were seen: four on *Astragalus garbancillo* Cav. and three on *A. micranthellus* Wedd. (Leguminosae) (determinations by R. Barneby, New York Botanic Garden). These are the first field host records of *T. distincta* and the first of any *Tatochila* (or indeed any Pierine) on a Legume. Both *Astragalus* are also hosts of *Colias blameyi* Jorg. at Tres Cruces; *A. garbancillo* is strongly ascending while *A. micranthellus* in low and tufted. The fact that *T. distincta* oviposits freely and develops to maturity on Crucifers in captivity suggests that Crucifer-feeding is primitive and *Astragalus*-feeding a derivative condition in *Tatochila.* I thank Mr. Robert Eisele for field companionship on the 1986 trip.